**Lab Assignment-3**

Course: Probability and Statistics

Course code: BMAT202P

Date: 04-03-2026

**Answer all the questions using R markdown and upload in VTOP.**

1. A big company uses thousands of CFL lights every year. The brand that the company has been using in the past has average life of 1200 hours. A new brand is offered to the company at a price lower than they are paying Fig. 10.5 35 for the old brand. Consequently, a sample of 100 CFL light of new brand Large Sample Tests is tested which yields an average life of 1220 hours with standard deviation 90 hours. Should the company accept the new brand at 5% level of significance?

2. A manufacturer of ball point pens claims that a certain pen manufactured by him has a mean writing-life at least 460 A-4 size pages. A purchasing agent selects a sample of 100 pens and put them on the test. The mean writing-life of the sample found 453 A-4 size pages with standard deviation 25 A-4 size pages. Should the purchasing agent reject the manufacturer's claim at 1% level of significance?

3. In two samples of women from Punjab and Tamilnadu, the mean height of 1000 and 2000 women are 67.6 and 68.0 inches respectively. If population standard deviation of Punjab and Tamilnadu are same and equal to 5.5 inches then, can the mean heights of Punjab and Tamilnadu women be regarded as same at 1% level of significance?

4. A university conducts both face to face and distance mode classes for a particular course indented both to be identical. A sample of 50 students of face-to-face mode yields examination results mean and SD respectively as:
   $\bar{X}$ 80.4, $S1$ =12.8 and other sample of 100 distance-mode students yields mean and SD of their Large Sample Tests examination results in the same course respectively as: $\bar{Y} =$ 74.3, $S2$= 20.5. Are both educational methods statistically equal at 5% level?

   **For the below questions do the plotting we did as in lab class i.e., show the normally distributed and plot the probability value.**

5. Car servicing times have a mean of 80 minutes and a standard deviation of 20 . Find the probability that the mean servicing times of 40 cars will exceed 83 minutes.
6. The masses of a particular variety of tomatoes, in grams, are assumed to be Normally distributed with mean 162 and standard deviation 14. A random sample of 12 tomatoes of this variety is selected. Determine the probability that the mean mass of this sample will be between 160 and 165 grams.
7. The lifetimes of a certain brand of battery have a mean of 45 hours and a standard deviation of 18. Find the probability that the mean lifetime of random sample of such 50 batteries will be between 40 and 48 hours.

8. Mini-cakes having a mean weight of 145 grams and standard deviation 9 grams are packed in boxes of 12. A box of these mini-cakes is selected at random. If the weights of these mini-cakes are Normally distributed, determine the probability that the mean weight of the mini-cakes in the box will be greater than 150 grams.
9. The mean of a normal random variable X is 60 . The mean of 25 random observations of X is denoted by X . Given that P X( < = 58.2 0.0668 ) , determine the variance of X.
10. The times taken to service a family size car have a mean of 95 minutes and a standard deviation of 60 . Find the probability that the mean servicing time of 30 family size cars will exceed 68 minutes.